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TRANSLATOR'S AFFIDAVIT

I, Andrew Wilford, a citizen of the United States of America, residing in Dobbs Ferry, New York, depose and state that:

I am familiar with the English and German languages;

I have read a copy of the German-language document PCT application PCT/DE2005/000101 published 18 August 2005 as WO/2005/075293; and

The hereto-attached English-language text is an accurate translation of this German-language document.

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Sworn to and subscribed before me
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METHOD AND DEVICE FOR TRANSFERRING PRODUCTS FROM A SUPPLY VESSEL INTO THE BLISTERS OF A FOIL

The invention relates to a method for transferring objects, particularly tablets, capsules, coated pills, pills or the like from a supply vessel to blisters of a continuously or intermittently moving foil, transfer blisters being formed in a transfer belt corresponding in their position to the position of the blisters in the foil, the transfer belt in the form of an endlessly running belt being positioned on a first and on a second deflection roller for subsequently being filled with the objects from the supply vessel, for sorting the objects into the transfer blisters and for their transfer to a plurality of placers by means of which the objects are directly picked up from the transfer blisters and transferred to the blisters.

A further object of the invention is a device for carrying out such a method.

DE 199 26 893 describes a device with the help of which pharmaceutical objects can be picked up from a supply vessel and transferred to the blisters of a foil, that device being provided with a sorting plate with seats oriented in the same pattern like the blisters in the foil and fixed in the supply vessel. The sorting plate has a coordinated transfer plate with a number of suction grippers corresponding to the number of seats and their position, the transfer plate being movable from a filling position above the sorting plate to a delivery position above the foil.

This device has proven efficient in practice due to its reliable mode of operation in its allocated capacity range and due to its flexibility regarding different formats of objects that are only required to fit into the seats of the sorting plate. An increased performance of a device designed according to that concept, however, is not easily achieved due to the intermittent operation of the device.

Therefore, the invention is based on the object of providing a method for an easier and more flexible transfer of objects. Furthermore, it is the object of the invention to provide a device for carrying out this method.

This object is solved by the method mentioned above that is particularly distinguished by the fact that a transfer belt can be provided that is specifically adjusted to the shape and size of each object and that has transfer blisters into which the objects can be fitted. The objects are picked up from these transfer blisters, transferred and directly placed in the blisters by the placers. If the objects have a more complicated design and can only be fitted into the transfer blisters in one specific orientation, nothing but the length of the transfer belt has to be modified in order to provide the placers at each turn with completely filled transfer blisters.

It is especially preferred when the disposable transfer belt is removed from the deflecting rolls, disposed of, and replaced by a new transfer belt when it has fulfilled an exclusion criterion. Particularly as far as the packaging of pharmaceutical

objects is concerned, there are often such high requirements regarding hygiene that frequently the method has to be carried out in a clean room. With the present method a complex cleaning of the transfer belt is no longer necessary nor intended and thus production losses and high costs can be avoided. Instead, new transfer blisters are formed in a transfer belt and the latter is positioned on the deflection rollers, and in the same way, a format change can be carried out just as quickly and without causing any problems, whereas the size of the transfer blisters, or their orientation relative to each other, changes.

It is furthermore provided that the transfer belt is oriented perpendicular to the running direction of the foil, since this way the transfer belt is easily accessible and only a little space is required in the travel direction of the foil. Obviously, a parallel arrangement is possible, too.

If at least one section of at least an upper reach of the transfer belt is led upward in the transport direction, the objects picked from the supply vessel and placed on the transfer belt are transported in the travel direction by the transfer belt while gliding downward on the transfer belt, opposite the travel direction, under the action of gravity, as long as this process is not impeded due to a positive locking of the objects in the transfer blisters. This procedure allows the transfer blisters to be completely filled in an easier way. For the same reason the deflection roller facing the foil is a drive roller and the transfer belt is driven by reciprocating movements, hence, it is

not continuously moved in a forward direction but sometimes decelerated in its forward movement or even stopped occasionally and reaccelerated in order to create a permanent unsteadiness of the objects lying on the transfer belt.

A continuous nonslip drive of the transfer belt by means of the drive roller is achieved by the recesses provided in the drive roller to guarantee that the transfer blisters can be positively engaged for driving the transfer belt.

It is important that the transfer belt be quickly and easily made, since it is a disposable component. This way, in order to make the transfer belt, at least two transfer blisters are fitted together circumferentially to create a positive lock between the free ends of the transfer belt, the load capacity being very high due to the positive locking. Thanks to the high loading capacity, it is also possible to cut edges of the transfer belt after forming the blisters so that they match its working width, since lateral edges are not necessary for guaranteeing tensile strength.

A particularly preferred method within the framework of the invention is characterized in that several transfer belts are made, and oriented adjacent one other and driven in a synchronized manner, since due to such a parallel arrangement of the transfer belts increased performance is achieved in the easiest way and can thus be easily adjusted to the demands made on the method. Synchronization of the transfer belts is achieved in the simplest

way by synchronizing the adjacent transfer belts with the drive roller.

Since due to the connection of the free ends of the transfer belt, the transfer blisters in that area can be affected, it is furthermore provided that a sensor coordinated to the transfer belt detects the overlapping area of the formerly free ends of the transfer belt and that the placer accordingly adjusts picking of the objects dependent on the sensor signal, so that transfer blisters that are at a belt joint do not cause disturbances.

The part of the object regarding the device is solved, according to the invention, by a device that is characterized by a supply vessel for holding the objects and mounted above a transfer belt with a plurality of transfer blisters placed in positions corresponding to the positions of the blisters in the foil to be filled and that is led around two deflection rollers and is directed toward the foil; as well as by a placer for the direct transfer that separately picks the objects from the transfer blisters and places them in the blisters of the foil. Preferably, the placer is designed as pick-and-place system, with a plurality of pickers, particularly suckers or grippers, by means of which the objects are removed from the transfer blisters, transferred to and placed into the blisters and preferably the pickers are oriented such that their positions correspond to the positions of the blisters or of the transfer blisters. This device is characterized by the fact that only the transfer belt and the placer have to be

replaced for a format change. This way, there is no need to provide a plurality of components for adjusting for object format and its designated arrangement in the foil to a different format. Advantageously, the deflection roller is a drive roller and therefore is connected to a drive and has seats for blisters in its outer surface, in positions corresponding to the positions of the transfer blisters.

It is furthermore advantageous when a collecting tray is provided beneath the transfer belt, since this way contamination of large areas of the clean room can be avoided and the tray is the only component that has to be cleaned, whereas the transfer belt is disposed of or recycled. In order to return surplus objects that were not placed in the transfer blisters to the object cycle, a transport belt is provided parallel to the transfer belt for the return transport of the surplus objects placed on the transfer belt.

An increase in the performance of the device is achieved by providing several transfer belts and by arranging them parallel to each other and by synchronizing them by means of the drive roller that is driven by a servomotor. In order to avoid that objects that remain on the transfer belts disturb the operation of the placer, a flow blocker, particularly a scraper is oriented above the transfer belt. The flow blocker is tilted in the transport direction and prevents the objects from moving farther in the transport direction and throws the objects back in the opposite direction of the transport direction of the transfer belt, in order

to provide the possibility that the objects are refitted into a transfer blister. Within the framework of the invention it is furthermore preferred when the supply vessel is also oriented on a mobile rack like the transfer belt with the deflection rollers and the drive, since that way format may be changed causing only a 1minimal stoppage due to the fact that one rack has to be simply replaced by a different one, whereas the rack used before can be removed from the clean room and thoroughly cleaned and modified.

A further particularly preferred embodiment of the invention is characterized in that a satellite station is provided for making the transfer belt. For this purpose, the transfer belt consists of a thermoplastic foil and a forming tool for forming the transfer blisters is removably mounted in the satellite station. Due to the fact that the satellite station does not have to be used all the time, no high requirements need be satisfied and this way the satellite station, which can also be referred to as a forming station, can have a simple design and a simply designed forming tool can be used.

If the transfer blisters in the transfer belt have a vertical dimension less than the height of the objects to be placed in the transfer blisters, it is easier for the placer to operate, although in consequence of the disposable characteristic of the transfer belt it may also be adjusted without problems.

In order to support the sorting of the objects into the transfer blisters, a swivel plate is juxtaposed with an upper reach of the transfer belt.

It is particularly preferred when a camera is provided for monitoring the objects after their removal from the transfer blisters and before transfer into the blisters, since this camera allows monitoring of the bottom sides of the objects that otherwise cannot be accessed for such inspection. If the camera detects a defective object, its position is known as well such that the blister receiving the object may be directly removed.

In the following, the invention is further described by means of an embodiment illustrated in the drawing. Therein:

FIG. 1 is a schematic display of a device according to the invention in a lateral view;

FIG. 2 is a top view of the transfer belt coordinated to the foil;

FIG. 3 is a comparison of the depth of the blister illustrated on the left compared to the transfer blister on the right;

FIG. 4 is a schematic representation of the positively locked free ends of the transfer belts;

FIG. 5 is a schematic display of a lateral view of the transfer belt fitted around a drive roller; and

FIG. 6 is a top view of the transfer belt after the sectional formation of the transfer blisters and cutting of the thermoplastic foil in the satellite station.

FIG. 1 shows a device for transporting solid objects like tablets, capsules, coated tablets, pills or the like from a supply vessel 1 into the blisters 2 of a foil 3, for which the objects as

bulk materials are transferred from the supply vessel 1 to a transfer belt 4 that is fitted over two deflection rollers 5 and runs between the supply vessel 1 and the foil 3. The transfer belt 4 is provided with transfer blisters 6, whose positions correspond to the positions of the blisters 2 in the foil 3. The transfer belt 4 is driven by the deflection roller 5 engaging the foil 3 and designed as a drive roller and driven by a servomotor. The complete filling of the transfer blisters 6 in the transfer belt 4 is guaranteed by the controlled drive that executes a reciprocating movement, so that the objects are exposed to frequent accelerations due to their mass and inertia. In addition, a swivel plate 12 is provided for this purpose that is used complementarily or alternatively to the reciprocating movement for sorting the objects. As can be seen in FIG. 1 an upper reach of the transfer belt 4 is led upward for a part of its length in a transport direction, in order to thus be able to benefit from the action of gravity. Furthermore, a flow obstacle 7, namely a scraper, is provided above the transfer belt 4 tilted in the direction of the transport direction of the belt. This flow obstacle stops the objects that were not fitted into the transfer blisters 6 on the transport path covered so far and makes them slide back to the start of the transport path under the action of gravity, in order to offer a new possibility of being fitted into transfer blisters. The transfer belt 4 is oriented perpendicular to the travel direction of the foil 3 and thus can be led toward the foil 3 from a perpendicular direction or angle, since the supply vessel 1 as

well as the transfer belt 1 [translator's note: should read 4] with the deflection rollers 5 and the drive are mounted on a mobile rack 8 and therefore can be easily replaced.

Furthermore, a satellite station for the fabrication of the transfer belt 4 consisting of a thermoplastic foil that is not shown in the drawing is provided for the device. For this purpose, the satellite station is provided with a molding tool for forming the transfer blisters 6. The molding tool is removably mounted in the satellite station.

Among the further components of the device are the placers 9, by means of which the objects can be directly picked up from the transfer blisters 6, transferred to and placed into the blisters of the foil 3, a camera 13 being mounted beneath the placers 9 for monitoring the objects after their removal from the transfer blisters 6 and before their placement in the blisters 2.

FIG. 2 shows a top view of the parallel arrangement of several transfer belts 4, the synchronized drive of these transfer belts 4 being effected by a drive roller that is provided with recesses 10 in order to guarantee that the transfer blisters 6 can be positively locked (FIG. 5).

With such a device, the method according to the invention can be carried out, to which end at first the transfer belts 4 are fabricated out of thermoplastic foils, the free ends of the transfer belts 4 being permanently connected to each and positively locked by their transfer blisters 6. Subsequently, the transfer belt 4 thus produced is fitted around the two deflection rollers 5

and the placer 9 shaped according to the positions of the transfer blisters 6 is installed. It is to be noted that for a format change only the forming tool in the satellite station and the drive roller as well as the placer 9 have to be replaced, and, for the most part, the format change can be take care of outside of the production room due to the mobile installation of the device on a rack 8. Subsequent to the preparation steps, the objects from the supply vessel 1 are poured onto the transfer belt 4 and after sorting into the transfer blisters 6 they are transported by the transfer belt 4 to the placer 9 that picks up each object individually and transfers them into the blisters 2 of the foil 3. If the wear limit or the tolerable degree of contamination is exceeded, the method according to the invention is started over again and a new transfer belt 4 fabricated in the satellite station replaces the old transfer belt 4. It is to be considered that it is obviously equally possible to temporarily store the transfer belt 4 for a format change planned within the service life of the transfer belt 4, until the belt is reintroduced into the production process until the moment that the maximum service life is exceeded again.